IN THE CLAIMS:

1) (Currently Amended) A method of detecting soot and water content in diesel engine oil having a dielectric constant, the method comprising:

measuring a change in the dielectric constant in a first frequency band;

measuring a change in the dielectric constant in a second frequency band;

using the measured changes in the dielectric constant in the first frequency band and the second frequency band to calculate the water content in the oil; ~~and~~

using the measured changes in the dielectric constant in the first frequency band and the second frequency band to calculate the soot content in the oil; and

using an imaginary part of the dielectric constant to calculate the soot content in the oil by determining the ratio of the difference between an oscillator tuning voltage generating a first standing wave passing through a portion of the oil having a first soot content and an oscillator tuning voltage generating a second standing wave passing through a portion of the oil having a second soot content over a null voltage level measured for the oil having the second soot content.

2) (Original) The method of claim 1 wherein the first frequency band is approximately within a sub-AM band of frequencies.

3) (Original) The method of claim 1 wherein the second frequency band is approximately within a microwave band of frequencies.

4) (Original) The method of claim 1 wherein the frequency in the first band is approximately 100 kilohertz.

5) (Original) The method of claim 1 wherein the frequency in the second band is approximately 10 gigahertz.

6) (Canceled)

7) (Original) The method of claim 1 further comprising:

transmitting data indicative of at least one of the soot content and the water content to a display device within a vehicle.

8) (Currently Amended) An apparatus for estimating a percentage of soot content or a percentage of water content in a medium having a dielectric constant, the apparatus comprising:

means for measuring a change in the dielectric constant at a first frequency;

means for measuring a change in the dielectric constant at a second frequency; ~~and~~

a processor configured to calculate at least one of a percentage of soot content and a percentage of water content as a function of the measured changes in the dielectric constant at the first and second frequencies;

the means for measuring a change in the dielectric constant at a second frequency comprising:

a variable frequency source for generating the second frequency band within a microwave frequency band;

a probe operatively coupled with the variable frequency source wherein at least a portion of the probe is immersed within the oil so that a standing wave is produced in response to each microwave frequency;

a detector for detecting a null voltage associated with each standing wave; and

wherein the processor is configured to measure the change in the dielectric constant at the second frequency in response to the measured null voltage.

9) (Original) The apparatus of claim 8 further comprising:

a variable frequency oscillator for generating the first and second frequencies.

10) (Original) The apparatus of claim 8 wherein the first frequency is within approximately the sub-AM band of frequencies and the second frequency is within approximately the microwave frequency band.

11) (Original) The apparatus of claim 8, the means for measuring a change in the dielectric constant at a first frequency comprising:

a variable frequency source for generating the first frequency band within at least one of the ultrasonic and sub-AM frequency bands;

a probe operatively coupled with the variable frequency source wherein at least a portion of the probe is immersed within the oil so that a waveform of the first frequency passes within a portion of the oil; and

a capacitance detector for measuring a capacitance associated with the waveform; and

wherein the processor is configured to measure the change in the dielectric constant at the first frequency in response to the measured capacitance.

12) (Canceled)

13) (Currently Amended) The apparatus of claim [[12]] 8 further comprising:

means for controlling the microwave frequencies so that each null point of the standing wave for each frequency is placed at a detection point associated with the probe.

14) (Original) An apparatus for determining a concentration of soot and/or a concentration of water in diesel oil, the apparatus comprising:

at least one variable frequency source for generating one or more signals having different frequencies in a first frequency band and one or more signals having different frequencies in a second frequency band;

at least one probe operatively coupled with the at least one variable frequency source wherein at least a portion of the probe is immersed within the oil so that a respective waveform associated with the first frequency band and the second frequency band passes within a portion of the oil;

means for measuring a capacitance of the oil in response to the respective waveform associated with the first frequency passing through a portion of the oil;

a detector for detecting a null voltage level of respective waveforms associated with signals in the second frequency band; and

a processor configured to measure a first change in a dielectric constant of the diesel oil in response to the measured capacitance and a second change in the dielectric constant in response to changes in voltage standing waveforms associated with signals in the second frequency band and calculate at least one of a concentration of soot and a concentration of water where each of the calculations is a function of the measured changes in the dielectric constant.

15) (Original) The apparatus of claim 14, the at least one probe comprising:

an inner conductor configured to operate with microwave frequencies; and

an outer conductor configured to operate with at least one of an ultrasonic frequency band and a sub-AM frequency band.